

SEQUENCE LISTING

<110> Cytos Biotechnology AG
Maurer, Patrik
Bachmann, Martin
Proba, Karl
Meijerink, Edwin
Manolova, Vania

<120> Packaging of Immunostimulatory Substances into Virus-like
Particles: Method of Preparation and Use

<130> 1700.0630000

<150> 60/457,348

<151> 2003-03-26

<160> 111

<170> PatentIn version 3.2

<210> 1

<211> 10

<212> DNA

<213> Artificial sequence

<220>

<223> oligonucleotide ISS

<400> 1

gacgatcgtc

10

<210> 2

<211> 19

<212> DNA

<213> Artificial Sequence

<220>

<223> oligonucleotide G3-6

<400> 2

gggggacgatc gtcggggggg

19

<210> 3

<211> 20

<212> DNA

<213> Artificial Sequence

<220>

<223> oligonucleotide G4-6

<400> 3

ggggggacgat cgtcggggggg

20

<210> 4

<211> 21

<212> DNA

<213> Artificial sequence

<220>
 <223> oligonucleotide G5-6

<400> 4
 ggggggacga tcgtcggggg g 21

<210> 5
 <211> 22
 <212> DNA
 <213> Artificial sequence

<220>
 <223> oligonucleotide G6-6

<400> 5
 gggggggacg atcgtcgggg gg 22

<210> 6
 <211> 24
 <212> DNA
 <213> Artificial sequence

<220>
 <223> oligonucleotide G7-7

<400> 6
 gggggggggac gatcgtcggg gggg 24

<210> 7
 <211> 26
 <212> DNA
 <213> Artificial sequence

<220>
 <223> oligonucleotide G8-8

<400> 7
 gggggggggga cgatcgtcgg gggggg 26

<210> 8
 <211> 28
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> oligonucleotide G9-9

<400> 8
 gggggggggggg acgatcgtcg gggggggg 28

<210> 9
 <211> 30
 <212> DNA
 <213> Artificial sequence

<220>
 <223> oligonucleotide G6

<400> 9
 ggggggac gacgatcgtc gtcggggggg

30

<210> 10
 <211> 132
 <212> PRT
 <213> Bacteriophage Q-beta

<400> 10

Ala Lys Leu Glu Thr Val Thr Leu Gly Asn Ile Gly Lys Asp Gly Lys
 1 5 10 15

Gln Thr Leu Val Leu Asn Pro Arg Gly Val Asn Pro Thr Asn Gly Val
 20 25 30

Ala Ser Leu Ser Gln Ala Gly Ala Val Pro Ala Leu Glu Lys Arg Val
 35 40 45

Thr Val Ser Val Ser Gln Pro Ser Arg Asn Arg Lys Asn Tyr Lys Val
 50 55 60

Gln Val Lys Ile Gln Asn Pro Thr Ala Cys Thr Ala Asn Gly Ser Cys
 65 70 75 80

Asp Pro Ser Val Thr Arg Gln Ala Tyr Ala Asp Val Thr Phe Ser Phe
 85 90 95

Thr Gln Tyr Ser Thr Asp Glu Glu Arg Ala Phe Val Arg Thr Glu Leu
 100 105 110

Ala Ala Leu Leu Ala Ser Pro Leu Leu Ile Asp Ala Ile Asp Gln Leu
 115 120 125

Asn Pro Ala Tyr
 130

<210> 11
 <211> 328
 <212> PRT
 <213> Bacteriophage Q-beta

<400> 11

Met Ala Lys Leu Glu Thr Val Thr Leu Gly Asn Ile Gly Lys Asp Gly
 1 5 10 15

Lys Gln Thr Leu Val Leu Asn Pro Arg Gly Val Asn Pro Thr Asn Gly
 20 25 30

Val Ala Ser Leu Ser Gln Ala Gly Ala Val Pro Ala Leu Glu Lys Arg
 35 40 45

Val Thr Val Ser Val Ser Gln Pro Ser Arg Asn Arg Lys Asn Tyr Lys
 50 55 60

Val Gln Val Lys Ile Gln Asn Pro Thr Ala Cys Thr Ala Asn Gly Ser
 65 70 75 80

Cys Asp Pro Ser Val Thr Arg Gln Ala Tyr Ala Asp Val Thr Phe Ser
 85 90 95

Phe Thr Gln Tyr Ser Thr Asp Glu Glu Arg Ala Phe Val Arg Thr Glu
 100 105 110

Leu Ala Ala Leu Leu Ala Ser Pro Leu Leu Ile Asp Ala Ile Asp Gln
 115 120 125

Leu Asn Pro Ala Tyr Trp Leu Leu Ile Ala Gly Gly Gly Ser Gly Ser
 130 135 140

Lys Pro Asp Pro Val Ile Pro Asp Pro Pro Ile Asp Pro Pro Pro Gly
 145 150 155 160

Thr Gly Lys Tyr Thr Cys Pro Phe Ala Ile Trp Ser Leu Glu Glu Val
 165 170 175

Tyr Glu Pro Pro Thr Lys Asn Arg Pro Trp Pro Ile Tyr Asn Ala Val
 180 185 190

Glu Leu Gln Pro Arg Glu Phe Asp Val Ala Leu Lys Asp Leu Leu Gly
 195 200 205

Asn Thr Lys Trp Arg Asp Trp Asp Ser Arg Leu Ser Tyr Thr Thr Phe
 210 215 220

Arg Gly Cys Arg Gly Asn Gly Tyr Ile Asp Leu Asp Ala Thr Tyr Leu
 225 230 235 240

Ala Thr Asp Gln Ala Met Arg Asp Gln Lys Tyr Asp Ile Arg Glu Gly
 245 250 255

Lys Lys Pro Gly Ala Phe Gly Asn Ile Glu Arg Phe Ile Tyr Leu Lys

Val Gln Gly Ser Asn Phe His Phe Phe Ala Val Gly Gly Asp Pro Leu
 145 150 155 160

Glu Met Gln Gly Val Leu Met Asn Tyr Arg Thr Lys Tyr Pro Gln Gly
 165 170 175

Thr Ile Thr Pro Lys Asn Pro Thr Ala Gln Ser Gln Val Met Asn Thr
 180 185 190

Asp His Lys Ala Tyr Leu Asp Lys Asn Asn Ala Tyr Pro Val Glu Cys
 195 200 205

Trp Ile Pro Asp Pro Ser Arg Asn Glu Asn Thr Arg Tyr Phe Gly Thr
 210 215 220

Tyr Thr Gly Gly Glu Asn Val Pro Pro Val Leu His Val Thr Asn Thr
 225 230 235 240

Ala Thr Thr Val Leu Leu Asp Glu Gln Gly Val Gly Pro Leu Cys Lys
 245 250 255

Ala Asp Ser Leu Tyr Val Ser Ala Ala Asp Ile Cys Gly Leu Phe Thr
 260 265 270

Asn Ser Ser Gly Thr Gln Gln Trp Arg Gly Leu Ala Arg Tyr Phe Lys
 275 280 285

Ile Arg Leu Arg Lys Arg Ser Val Lys Asn Pro Tyr Pro Ile Ser Phe
 290 295 300

Leu Leu Ser Asp Leu Ile Asn Arg Arg Thr Gln Lys Val Asp Gly Gln
 305 310 315 320

Pro Met Tyr Gly Met Glu Ser Gln Val Glu Glu Val Arg Val Phe Asp
 325 330 335

Gly Thr Glu Gln Leu Pro Gly Asp Pro Asp Met Ile Arg Tyr Ile Asp
 340 345 350

Arg Gln Gly Gln Leu Gln Thr Lys Met Val
 355 360

<210> 13
 <211> 130
 <212> PRT
 <213> Bacteriophage fr

<400> 13

Met Ala Ser Asn Phe Glu Glu Phe Val Leu Val Asp Asn Gly Gly Thr
 1 5 10 15

Gly Asp Val Lys Val Ala Pro Ser Asn Phe Ala Asn Gly Val Ala Glu
 20 25 30

Trp Ile Ser Ser Asn Ser Arg Ser Gln Ala Tyr Lys Val Thr Cys Ser
 35 40 45

Val Arg Gln Ser Ser Ala Asn Asn Arg Lys Tyr Thr Val Lys Val Glu
 50 55 60

Val Pro Lys Val Ala Thr Gln Val Gln Gly Gly Val Glu Leu Pro Val
 65 70 75 80

Ala Ala Trp Arg Ser Tyr Met Asn Met Glu Leu Thr Ile Pro Val Phe
 85 90 95

Ala Thr Asn Asp Asp Cys Ala Leu Ile Val Lys Ala Leu Gln Gly Thr
 100 105 110

Phe Lys Thr Gly Asn Pro Ile Ala Thr Ala Ile Ala Ala Asn Ser Gly
 115 120 125

Ile Tyr
 130

<210> 14

<211> 130

<212> PRT

<213> Bacteriophage GA

<400> 14

Met Ala Thr Leu Arg Ser Phe Val Leu Val Asp Asn Gly Gly Thr Gly
 1 5 10 15

Asn Val Thr Val Val Pro Val Ser Asn Ala Asn Gly Val Ala Glu Trp
 20 25 30

Leu Ser Asn Asn Ser Arg Ser Gln Ala Tyr Arg Val Thr Ala Ser Tyr
 35 40 45

Arg Ala Ser Gly Ala Asp Lys Arg Lys Tyr Ala Ile Lys Leu Glu Val
 50 55 60

Pro Lys Ile Val Thr Gln Val Val Asn Gly Val Glu Leu Pro Gly Ser
65 70 75 80

Ala Trp Lys Ala Tyr Ala Ser Ile Asp Leu Thr Ile Pro Ile Phe Ala
85 90 95

Ala Thr Asp Asp Val Thr Val Ile Ser Lys Ser Leu Ala Gly Leu Phe
100 105 110

Lys Val Gly Asn Pro Ile Ala Glu Ala Ile Ser Ser Gln Ser Gly Phe
115 120 125

Tyr Ala
130

<210> 15
<211> 594
<212> DNA
<213> Artificial Sequence

<220>
<223> HBcAg containing p33 from LCMV

<220>
<221> CDS
<222> (1)..(591)

<400> 15
atg gac att gac cct tat aaa gaa ttt gga gct act gtg gag tta ctc 48
Met Asp Ile Asp Pro Tyr Lys Glu Phe Gly Ala Thr Val Glu Leu Leu
1 5 10 15

tcg ttt ttg cct tct gac ttc ttt cct tcc gtc aga gat ctc cta gac 96
Ser Phe Leu Pro Ser Asp Phe Phe Pro Ser Val Arg Asp Leu Leu Asp
20 25 30

acc gcc tca gct ctg tat cga gaa gcc tta gag tct cct gag cat tgc 144
Thr Ala Ser Ala Leu Tyr Arg Glu Ala Leu Glu Ser Pro Glu His Cys
35 40 45

tca cct cac cat act gca ctc agg caa gcc att ctc tgc tgg ggg gaa 192
Ser Pro His His Thr Ala Leu Arg Gln Ala Ile Leu Cys Trp Gly Glu
50 55 60

ttg atg act cta gct acc tgg gtg ggt aat aat ttg gaa gat cca gca 240
Leu Met Thr Leu Ala Thr Trp Val Gly Asn Asn Leu Glu Asp Pro Ala
65 70 75 80

tcc agg gat cta gta gtc aat tat gtt aat act aac atg ggt tta aag 288
Ser Arg Asp Leu Val Val Asn Tyr Val Asn Thr Asn Met Gly Leu Lys
85 90 95

atc agg caa cta ttg tgg ttt cat ata tct tgc ctt act ttt gga aga 336
Ile Arg Gln Leu Leu Trp Phe His Ile Ser Cys Leu Thr Phe Gly Arg

100	105	110	
gag act gta ctt gaa tat ttg gtc tct ttc gga gtg tgg att cgc act			384
Glu Thr Val Leu Glu Tyr Leu Val Ser Phe Gly Val Trp Ile Arg Thr			
115	120	125	
cct cca gcc tat aga cca cca aat gcc cct atc tta tca aca ctt ccg			432
Pro Pro Ala Tyr Arg Pro Pro Asn Ala Pro Ile Leu Ser Thr Leu Pro			
130	135	140	
gaa act act gtt gtt aga cga cgg gac cga ggc agg tcc cct aga aga			480
Glu Thr Thr Val Val Arg Arg Arg Asp Arg Gly Arg Ser Pro Arg Arg			
145	150	155	160
aga act ccc tcg cct cgc aga cgc aga tct caa tcg ccg cgt cgc aga			528
Arg Thr Pro Ser Pro Arg Arg Arg Arg Ser Gln Ser Pro Arg Arg Arg			
165	170	175	
aga tct caa tct cgg gaa tct caa tgt ctt ctc ctt aaa gct gtt tac			576
Arg Ser Gln Ser Arg Glu Ser Gln Cys Leu Leu Leu Lys Ala Val Tyr			
180	185	190	
aac ttc gct acc atg taa			594
Asn Phe Ala Thr Met			
195			

<210> 16
 <211> 197
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> HBcAg containing p33 from LCMV

<400> 16

Met Asp Ile Asp Pro Tyr Lys Glu Phe Gly Ala Thr Val Glu Leu Leu			
1	5	10	15
Ser Phe Leu Pro Ser Asp Phe Phe Pro Ser Val Arg Asp Leu Leu Asp			
20	25	30	
Thr Ala Ser Ala Leu Tyr Arg Glu Ala Leu Glu Ser Pro Glu His Cys			
35	40	45	
Ser Pro His His Thr Ala Leu Arg Gln Ala Ile Leu Cys Trp Gly Glu			
50	55	60	
Leu Met Thr Leu Ala Thr Trp Val Gly Asn Asn Leu Glu Asp Pro Ala			
65	70	75	80
Ser Arg Asp Leu Val Val Asn Tyr Val Asn Thr Asn Met Gly Leu Lys			
85	90	95	

Ile Arg Gln Leu Leu Trp Phe His Ile Ser Cys Leu Thr Phe Gly Arg
 100 105 110

Glu Thr Val Leu Glu Tyr Leu Val Ser Phe Gly Val Trp Ile Arg Thr
 115 120 125

Pro Pro Ala Tyr Arg Pro Pro Asn Ala Pro Ile Leu Ser Thr Leu Pro
 130 135 140

Glu Thr Thr Val Val Arg Arg Arg Asp Arg Gly Arg Ser Pro Arg Arg
 145 150 155 160

Arg Thr Pro Ser Pro Arg Arg Arg Arg Ser Gln Ser Pro Arg Arg Arg
 165 170 175

Arg Ser Gln Ser Arg Glu Ser Gln Cys Leu Leu Leu Lys Ala Val Tyr
 180 185 190

Asn Phe Ala Thr Met
 195

<210> 17
 <211> 246
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> dsDNA fragment for packaging and stabilization of BKV

<400> 17
 ggcggtggtg tcagatctac aatgatcgtc atcaccttgg tgatgctgaa gaagaaacag 60
 tacacatcca ttcatcatgg tgtggtggag gttgacgccg ctgtcacccc agaggagcgc 120
 cacctgtcca agatgcagca gaacggctac gaaaatccaa cctacaagtt ctttgagcag 180
 atgcagaacg ctagctatcc atacgatgtc cctgattacg cctaacgcga attcgccagc 240
 acagtg 246

<210> 18
 <211> 5
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> GGKGG Linker

<400> 18

Gly Gly Lys Gly Gly
 1 5

<210> 19
 <211> 128
 <212> PRT
 <213> Bacteriophage PP7

<400> 19

Met Ser Lys Thr Ile Val Leu Ser Val Gly Glu Ala Thr Arg Thr Leu
 1 5 10 15

Thr Glu Ile Gln Ser Thr Ala Asp Arg Gln Ile Phe Glu Glu Lys Val
 20 25 30

Gly Pro Leu Val Gly Arg Leu Arg Leu Thr Ala Ser Leu Arg Gln Asn
 35 40 45

Gly Ala Lys Thr Ala Tyr Arg Val Asn Leu Lys Leu Asp Gln Ala Asp
 50 55 60

Val Val Asp Cys Ser Thr Ser Val Cys Gly Glu Leu Pro Lys Val Arg
 65 70 75 80

Tyr Thr Gln Val Trp Ser His Asp Val Thr Ile Val Ala Asn Ser Thr
 85 90 95

Glu Ala Ser Arg Lys Ser Leu Tyr Asp Leu Thr Lys Ser Leu Val Ala
 100 105 110

Thr Ser Gln Val Glu Asp Leu Val Val Asn Leu Val Pro Leu Gly Arg
 115 120 125

<210> 20
 <211> 132
 <212> PRT
 <213> Bacteriophage Q-beta

<400> 20

Ala Lys Leu Glu Thr Val Thr Leu Gly Asn Ile Gly Arg Asp Gly Lys
 1 5 10 15

Gln Thr Leu Val Leu Asn Pro Arg Gly Val Asn Pro Thr Asn Gly Val
 20 25 30

Ala Ser Leu Ser Gln Ala Gly Ala Val Pro Ala Leu Glu Lys Arg Val
 35 40 45

Thr Val Ser Val Ser Gln Pro Ser Arg Asn Arg Lys Asn Tyr Lys Val
 50 55 60

Gln Val Lys Ile Gln Asn Pro Thr Ala Cys Thr Ala Asn Gly Ser Cys
65 70 75 80

Asp Pro Ser Val Thr Arg Gln Lys Tyr Ala Asp Val Thr Phe Ser Phe
85 90 95

Thr Gln Tyr Ser Thr Asp Glu Glu Arg Ala Phe Val Arg Thr Glu Leu
100 105 110

Ala Ala Leu Leu Ala Ser Pro Leu Leu Ile Asp Ala Ile Asp Gln Leu
115 120 125

Asn Pro Ala Tyr
130

<210> 21
<211> 132
<212> PRT
<213> Bacteriophage Q-beta

<400> 21

Ala Lys Leu Glu Thr Val Thr Leu Gly Lys Ile Gly Lys Asp Gly Lys
1 5 10 15

Gln Thr Leu Val Leu Asn Pro Arg Gly Val Asn Pro Thr Asn Gly Val
20 25 30

Ala Ser Leu Ser Gln Ala Gly Ala Val Pro Ala Leu Glu Lys Arg Val
35 40 45

Thr Val Ser Val Ser Gln Pro Ser Arg Asn Arg Lys Asn Tyr Lys Val
50 55 60

Gln Val Lys Ile Gln Asn Pro Thr Ala Cys Thr Ala Asn Gly Ser Cys
65 70 75 80

Asp Pro Ser Val Thr Arg Gln Lys Tyr Ala Asp Val Thr Phe Ser Phe
85 90 95

Thr Gln Tyr Ser Thr Asp Glu Glu Arg Ala Phe Val Arg Thr Glu Leu
100 105 110

Ala Ala Leu Leu Ala Ser Pro Leu Leu Ile Asp Ala Ile Asp Gln Leu
115 120 125

Asn Pro Ala Tyr
130

<210> 22
<211> 132
<212> PRT
<213> Bacteriophage Q-beta

<400> 22

Ala Arg Leu Glu Thr Val Thr Leu Gly Asn Ile Gly Arg Asp Gly Lys
1 5 10 15

Gln Thr Leu Val Leu Asn Pro Arg Gly Val Asn Pro Thr Asn Gly Val
20 25 30

Ala Ser Leu Ser Gln Ala Gly Ala Val Pro Ala Leu Glu Lys Arg Val
35 40 45

Thr Val Ser Val Ser Gln Pro Ser Arg Asn Arg Lys Asn Tyr Lys Val
50 55 60

Gln Val Lys Ile Gln Asn Pro Thr Ala Cys Thr Ala Asn Gly Ser Cys
65 70 75 80

Asp Pro Ser Val Thr Arg Gln Lys Tyr Ala Asp Val Thr Phe Ser Phe
85 90 95

Thr Gln Tyr Ser Thr Asp Glu Glu Arg Ala Phe Val Arg Thr Glu Leu
100 105 110

Ala Ala Leu Leu Ala Ser Pro Leu Leu Ile Asp Ala Ile Asp Gln Leu
115 120 125

Asn Pro Ala Tyr
130

<210> 23
<211> 132
<212> PRT
<213> Bacteriophage Q-beta

<400> 23

Ala Lys Leu Glu Thr Val Thr Leu Gly Asn Ile Gly Lys Asp Gly Arg
1 5 10 15

Gln Thr Leu Val Leu Asn Pro Arg Gly Val Asn Pro Thr Asn Gly Val
20 25 30

Ala Ser Leu Ser Gln Ala Gly Ala Val Pro Ala Leu Glu Lys Arg Val
 35 40 45

Thr Val Ser Val Ser Gln Pro Ser Arg Asn Arg Lys Asn Tyr Lys Val
 50 55 60

Gln Val Lys Ile Gln Asn Pro Thr Ala Cys Thr Ala Asn Gly Ser Cys
 65 70 75 80

Asp Pro Ser Val Thr Arg Gln Lys Tyr Ala Asp Val Thr Phe Ser Phe
 85 90 95

Thr Gln Tyr Ser Thr Asp Glu Glu Arg Ala Phe Val Arg Thr Glu Leu
 100 105 110

Ala Ala Leu Leu Ala Ser Pro Leu Leu Ile Asp Ala Ile Asp Gln Leu
 115 120 125

Asn Pro Ala Tyr
 130

<210> 24
 <211> 132
 <212> PRT
 <213> Bacteriophage Q-beta

<400> 24

Ala Arg Leu Glu Thr Val Thr Leu Gly Asn Ile Gly Lys Asp Gly Arg
 1 5 10 15

Gln Thr Leu Val Leu Asn Pro Arg Gly Val Asn Pro Thr Asn Gly Val
 20 25 30

Ala Ser Leu Ser Gln Ala Gly Ala Val Pro Ala Leu Glu Lys Arg Val
 35 40 45

Thr Val Ser Val Ser Gln Pro Ser Arg Asn Arg Lys Asn Tyr Lys Val
 50 55 60

Gln Val Lys Ile Gln Asn Pro Thr Ala Cys Thr Ala Asn Gly Ser Cys
 65 70 75 80

Asp Pro Ser Val Thr Arg Gln Lys Tyr Ala Asp Val Thr Phe Ser Phe
 85 90 95

Thr Gln Tyr Ser Thr Asp Glu Glu Arg Ala Phe Val Arg Thr Glu Leu

100	105	110
Ala Ala Leu Leu Ala Ser Pro Leu Leu Ile Asp Ala Ile Asp Gln Leu		
115	120	125
Asn Pro Ala Tyr		
130		
<210> 25		
<211> 184		
<212> PRT		
<213> Hepatitis B virus		
<400> 25		
Met Asp Ile Asp Pro Tyr Glu Phe Gly Ala Thr Val Glu Leu Leu Ser		
1	5	10 15
Phe Leu Pro Ser Asp Phe Phe Pro Ser Val Arg Asp Leu Leu Asp Thr		
20	25	30
Ala Ser Ala Leu Tyr Arg Glu Ala Leu Glu Ser Pro Glu His Cys Ser		
35	40	45
Pro His His Thr Ala Leu Arg Gln Ala Ile Leu Cys Trp Gly Glu Leu		
50	55	60
Met Thr Leu Ala Thr Trp Val Gly Asn Asn Leu Glu Asp Pro Ala Ser		
65	70	75 80
Arg Asp Leu Val Val Asn Tyr Val Asn Thr Asn Met Gly Leu Lys Ile		
85	90	95
Arg Gln Leu Leu Trp Phe His Ile Ser Cys Leu Thr Phe Gly Arg Glu		
100	105	110
Thr Val Leu Glu Tyr Leu Val Ser Phe Gly Val Trp Ile Arg Thr Pro		
115	120	125
Pro Ala Tyr Arg Pro Pro Asn Ala Pro Ile Leu Ser Thr Leu Pro Glu		
130	135	140
Thr Thr Val Val Arg Arg Arg Asp Arg Gly Arg Ser Pro Arg Arg Arg		
145	150	155 160
Thr Pro Ser Pro Arg Arg Arg Arg Ser Gln Ser Pro Arg Arg Arg Arg		
165	170	175

Ser Gln Ser Arg Glu Ser Gln Cys
180

<210> 26
<211> 213
<212> PRT
<213> Hepatitis B virus

<400> 26

Met Gln Leu Phe His Leu Cys Leu Ile Ile Ser Cys Ser Cys Pro Thr
1 5 10 15

Val Gln Ala Ser Lys Leu Cys Leu Gly Trp Leu Trp Gly Met Asp Ile
20 25 30

Asp Pro Tyr Lys Glu Phe Gly Ala Thr Val Glu Leu Leu Ser Phe Leu
35 40 45

Pro Ser Asp Phe Phe Pro Ser Val Arg Asp Leu Leu Asp Thr Ala Ser
50 55 60

Ala Leu Tyr Arg Glu Ala Leu Glu Ser Pro Glu His Cys Ser Pro His
65 70 75 80

His Thr Ala Leu Arg Gln Ala Ile Leu Cys Trp Gly Asp Leu Met Asn
85 90 95

Leu Ala Thr Trp Val Gly Gly Asn Leu Glu Asp Pro Val Ser Arg Asp
100 105 110

Leu Val Val Gly Tyr Val Asn Thr Thr Val Gly Leu Lys Phe Arg Gln
115 120 125

Leu Leu Trp Phe His Ile Ser Cys Leu Thr Phe Gly Arg Glu Thr Val
130 135 140

Ile Glu Tyr Leu Val Ser Phe Gly Val Trp Ile Arg Thr Pro Pro Ala
145 150 155 160

Tyr Arg Pro Pro Asn Ala Pro Ile Leu Ser Thr Leu Pro Glu Thr Thr
165 170 175

Val Val Arg Arg Arg Gly Arg Ser Pro Arg Arg Arg Thr Pro Ser Pro
180 185 190

Pro Arg Arg Arg Arg Ser Gln Ser Pro Arg Arg Arg Arg Ser Gln Ser

195

200

205

Arg Glu Ser Gln Cys
210

<210> 27
<211> 188
<212> PRT
<213> Hepatitis B virus

<400> 27

Met Asp Ile Asp Pro Tyr Lys Glu Phe Gly Ser Ser Tyr Gln Leu Leu
1 5 10 15

Asn Phe Leu Pro Leu Asp Phe Phe Pro Asp Leu Asn Ala Leu Val Asp
20 25 30

Thr Ala Thr Ala Leu Tyr Glu Glu Glu Leu Thr Gly Arg Glu His Cys
35 40 45

Ser Pro His His Thr Ala Ile Arg Gln Ala Leu Val Cys Trp Asp Glu
50 55 60

Leu Thr Lys Leu Ile Ala Trp Met Ser Ser Asn Ile Thr Ser Glu Gln
65 70 75 80

Val Arg Thr Ile Ile Val Asn His Val Asn Asp Thr Trp Gly Leu Lys
85 90 95

Val Arg Gln Ser Leu Trp Phe His Leu Ser Cys Leu Thr Phe Gly Gln
100 105 110

His Thr Val Gln Glu Phe Leu Val Ser Phe Gly Val Trp Ile Arg Thr
115 120 125

Pro Ala Pro Tyr Arg Pro Pro Asn Ala Pro Ile Leu Ser Thr Leu Pro
130 135 140

Glu His Thr Val Ile Arg Arg Arg Gly Gly Ala Arg Ala Ser Arg Ser
145 150 155 160

Pro Arg Arg Arg Thr Pro Ser Pro Arg Arg Arg Arg Ser Gln Ser Pro
165 170 175

Arg Arg Arg Arg Ser Gln Ser Pro Ser Thr Asn Cys
180 185

<210> 28
 <211> 185
 <212> PRT
 <213> Hepatitis B virus

<400> 28

Met Asp Ile Asp Pro Tyr Lys Glu Phe Gly Ala Thr Val Glu Leu Leu
 1 5 10 15

Ser Phe Leu Pro Ser Asp Phe Phe Pro Ser Val Arg Asp Leu Leu Asp
 20 25 30

Thr Ala Ser Ala Leu Tyr Arg Glu Ala Leu Glu Ser Pro Glu His Cys
 35 40 45

Ser Pro His His Thr Ala Leu Arg Gln Ala Ile Leu Cys Trp Gly Glu
 50 55 60

Leu Met Thr Leu Ala Thr Trp Val Gly Asn Asn Leu Glu Asp Pro Ala
 65 70 75 80

Ser Arg Asp Leu Val Val Asn Tyr Val Asn Thr Asn Met Gly Leu Lys
 85 90 95

Ile Arg Gln Leu Leu Trp Phe His Ile Ser Cys Leu Thr Phe Gly Arg
 100 105 110

Glu Thr Val Leu Glu Tyr Leu Val Ser Phe Gly Val Trp Ile Arg Thr
 115 120 125

Pro Pro Ala Tyr Arg Pro Pro Asn Ala Pro Ile Leu Ser Thr Leu Pro
 130 135 140

Glu Thr Thr Val Val Arg Arg Arg Asp Arg Gly Arg Ser Pro Arg Arg
 145 150 155 160

Arg Thr Pro Ser Pro Arg Arg Arg Arg Ser Gln Ser Pro Arg Arg Arg
 165 170 175

Arg Ser Gln Ser Arg Glu Ser Gln Cys
 180 185

<210> 29
 <211> 152
 <212> PRT
 <213> Hepatitis B virus

<400> 29

Met Asp Ile Asp Pro Tyr Lys Glu Phe Gly Ala Thr Val Glu Leu Leu
 1 5 10 15

Ser Phe Leu Pro Ser Asp Phe Phe Pro Ser Val Arg Asp Leu Leu Asp
 20 25 30

Thr Ala Ala Ala Leu Tyr Arg Asp Ala Leu Glu Ser Pro Glu His Cys
 35 40 45

Ser Pro His His Thr Ala Leu Arg Gln Ala Ile Leu Cys Trp Gly Asp
 50 55 60

Leu Met Thr Leu Ala Thr Trp Val Gly Thr Asn Leu Glu Asp Gly Gly
 65 70 75 80

Lys Gly Gly Ser Arg Asp Leu Val Val Ser Tyr Val Asn Thr Asn Val
 85 90 95

Gly Leu Lys Phe Arg Gln Leu Leu Trp Phe His Ile Ser Cys Leu Thr
 100 105 110

Phe Gly Arg Glu Thr Val Leu Glu Tyr Leu Val Ser Phe Gly Val Trp
 115 120 125

Ile Arg Thr Pro Pro Ala Tyr Arg Pro Pro Asn Ala Pro Ile Leu Ser
 130 135 140

Thr Leu Pro Glu Thr Thr Val Val
 145 150

<210> 30

<211> 3635

<212> DNA

<213> Artificial Sequence

<220>

<223> plasmid pAP283-58

<400> 30

cgagctcgcc cctggcttat cgaaattaat acgactcact atagggagac cggaattcga 60

gctcgcccgg ggatcctcta gaattttctg cgcacccatc ccgggtggcg cccaaagtga 120

ggaaaatcac atggcaaata agccaatgca accgatcaca tctacagcaa ataaaattgt 180

gtggtcggat ccaactcgtt tatcaactac attttcagca agtctgttac gccaacgtgt 240

taaagttggt atagccgaac tgaataatgt ttcagggtcaa tatgtatctg tttataagcg 300

tcctgcacct	aaaccggaag	gttgtgcaga	tgccctgtgtc	attatgccga	atgaaaacca	360
atccattcgc	acagtgattt	cagggtcagc	cgaaaacttg	gctaccttaa	aagcagaatg	420
ggaaactcac	aaacgtaacg	ttgacacact	cttcgcgagc	ggcaacgccg	gtttgggttt	480
ccttgaccct	actgoggcta	tcgtatcgtc	tgatactact	gcttaagctt	gtattctata	540
gtgtcaccta	aatcgatatg	gtatgatata	taaggttatg	tattaattgt	agccgcgttc	600
taacgacaat	atgtacaagc	ctaattgtgt	agcatctggc	ttactgaagc	agaccctatc	660
atctctctcg	taaactgccg	tcagagtcgg	tttggttggg	cgaaccttct	gagtttctgg	720
taacgccgtt	ccgcaccccg	gaaatgggtca	ccgaaccaat	cagcaggggc	atcgctagcc	780
agatcctcta	cgccggacgc	atcgtagggc	gcatcaccgg	cgcacacagt	gcggttgctg	840
gcgcctatat	cgccgacatc	accgatgggg	aagatcgggc	tcgccacttc	gggctcatga	900
gcgcttggtt	cggcgtgggt	atggtggcag	gccccgtggc	cgggggactg	ttgggcgcca	960
tctccttgca	tgccaccattc	cttgccggcg	cggtgcttca	acggcctcaa	cctactactg	1020
ggctgcttcc	taatgcagga	gtcgcataag	ggagagcgtc	gatatggtgc	actctcagta	1080
caatctgctc	tgatgccgca	tagttaagcc	aactccgcta	tcgctacgtg	actgggtcat	1140
ggctgcgccc	cgacaccgcg	caacaccgcg	tgacgcgccc	tgacgggctt	gtctgctccc	1200
ggcatccgct	tacagacaag	ctgtgaccgt	ctccgggagc	tgcatgtgtc	agagggtttc	1260
accgtcatca	ccgaaacgcg	cgaggcagct	tgaagacgaa	agggcctcgt	gatacgcccta	1320
tttttatagg	ttaatgtcat	gataataatg	gtttcttaga	cgtcagggtg	cacttttcgg	1380
ggaaatgtgc	gcggaacccc	tatttggttta	tttttctaaa	tacattcaaa	tatgtatccg	1440
ctcatgagac	aataaccctg	ataaatgctt	caataatatt	gaaaaaggaa	gagtatgagt	1500
attcaacatt	tccgtgtcgc	ccttattccc	ttttttgcgg	cattttgcct	tcctgttttt	1560
gctcaccag	aaacgctggt	gaaagtaaaa	gatgctgaag	atcagttggg	tgacagagtg	1620
ggttacatcg	aactggatct	caacagcggc	aagatccttg	agagttttcg	ccccgaagaa	1680
cgttttccaa	tgatgagcac	ttttaaagtt	ctgctatgtg	gcgcgggtatt	atcccggtatt	1740
gacgccgggc	aagagcaact	cggtcgccgc	atacactatt	ctcagaatga	cttggttgag	1800
tactcaccag	tcacagaaaa	gcatcttacg	gatggcatga	cagtaagaga	attatgcagt	1860
gctgccataa	ccatgagtga	taacactgcg	gccaacttac	ttctgacaac	gatcggagga	1920
ccgaaggagc	taaccgcttt	tttgacacaac	atgggggatc	atgtaactcg	ccttgatcgt	1980
tggaaccgg	agctgaatga	agccatacca	aacgacgagc	gtgacaccac	gatgcctgta	2040
gcaatggcaa	caacgttgcg	caaactatta	actggcgaac	tacttactct	agcttcccgg	2100
caacaattaa	tagactggat	ggaggcggat	aaagttgcag	gaccacttct	gcgctcggcc	2160

```

cttccggctg gctggtttat tgetgataaa tctggagccg gtgagcgtgg gtctcgcggt 2220
atcattgcag cactggggcc agatggtaag ccctcccgta tcgtagttat ctacacgacg 2280
gggagtcagg caactatgga tgaacgaaat agacagatcg ctgagatagg tgccctactg 2340
attaagcatt ggtaactgtc agaccaagtt tactcatata tacttttagat tgatttataaa 2400
cttcattttt aatttataaag gatctaggtg aagatccttt ttgataatct catgacccaaa 2460
atcccttaac gtgagttttc gttccactga gcgtcagacc ccgtagaaaa gatcaaagga 2520
tcttcttgag atcctttttt tctgcgcgta atctgctgct tgcaaacaaa aaaaccaccg 2580
ctaccagcgg tggtttggtt gccggatcaa gagctaccaa ctctttttcc gaaggtaact 2640
ggcttcagca gagcgcagat accaaatact gtccttctag tgtagccgta gttaggccac 2700
cacttcaaga actctgtagc accgcctaca tacctcgctc tgctaatect gttaccagtg 2760
gctgctgcca gtggcgataa gtcgtgtctt accgggttgg actcaagacg atagttaccg 2820
gataaggcgc agcggtcggg ctgaacgggg gggtcgtgca cacagcccag cttggagcga 2880
acgacctaca ccgaactgag atacctacag cgcgagcatt gagaaagcgc cacgcttccc 2940
gaagggagaa aggcggacag gtatccggta agcggcaggg tcggaacagg agagcgcacg 3000
agggagcttc cagggggaaa cgctgggtat ctttatagtc ctgtcgggtt tcgccacctc 3060
tgacttgagc gtcgattttt gtgatgctcg tcaggggggc ggagcctatg gaaaaacgcc 3120
agcaacgcgg cttttttacg gttcctggcc ttttgctggc cttttgctca catgttcttt 3180
cctgcgttat cccctgattc tgtggataac cgtattaccg cttttgagtg agctgatacc 3240
gctcgccgca gccgaacgac gagcgcagcg agtcagttag cgaggaagcg gaagagcgcc 3300
caatacgcaa accgcctctc cccgcgcggt ggccgattca ttaatgcagc tgtggtgtca 3360
tggtcgggtg tcgccagggg gccgacgcgc atctcgactg catggtgcac caatgcttct 3420
ggcgtcaggc agccatcgga agctgtggta tggccgtgca ggtcgtaaat cactgcataa 3480
ttcgtgtcgc tcaaggcgca ctcccgttct ggataatgtt ttttgcgccg acatcataac 3540
ggttctggca aatattctga aatgagctgt tgacaattaa tcatcgaact agttaactag 3600
tacgcaagtt cacgtaaaaa gggatatcgcg gaatt 3635

```

```

<210> 31
<211> 131
<212> PRT
<213> Artificial Sequence

```

```

<220>
<223> AP205 coat protein

```

```

<400> 31

```

Met Ala Asn Lys Pro Met Gln Pro Ile Thr Ser Thr Ala Asn Lys Ile
 1 5 10 15

Val Trp Ser Asp Pro Thr Arg Leu Ser Thr Thr Phe Ser Ala Ser Leu
 20 25 30

Leu Arg Gln Arg Val Lys Val Gly Ile Ala Glu Leu Asn Asn Val Ser
 35 40 45

Gly Gln Tyr Val Ser Val Tyr Lys Arg Pro Ala Pro Lys Pro Glu Gly
 50 55 60

Cys Ala Asp Ala Cys Val Ile Met Pro Asn Glu Asn Gln Ser Ile Arg
 65 70 75 80

Thr Val Ile Ser Gly Ser Ala Glu Asn Leu Ala Thr Leu Lys Ala Glu
 85 90 95

Trp Glu Thr His Lys Arg Asn Val Asp Thr Leu Phe Ala Ser Gly Asn
 100 105 110

Ala Gly Leu Gly Phe Leu Asp Pro Thr Ala Ala Ile Val Ser Ser Asp
 115 120 125

Thr Thr Ala
 130

<210> 32
 <211> 131
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> AP205 coat protein

<400> 32

Met Ala Asn Lys Thr Met Gln Pro Ile Thr Ser Thr Ala Asn Lys Ile
 1 5 10 15

Val Trp Ser Asp Pro Thr Arg Leu Ser Thr Thr Phe Ser Ala Ser Leu
 20 25 30

Leu Arg Gln Arg Val Lys Val Gly Ile Ala Glu Leu Asn Asn Val Ser
 35 40 45

Gly Gln Tyr Val Ser Val Tyr Lys Arg Pro Ala Pro Lys Pro Glu Gly
 50 55 60

Cys Ala Asp Ala Cys Val Ile Met Pro Asn Glu Asn Gln Ser Ile Arg
65 70 75 80

Thr Val Ile Ser Gly Ser Ala Glu Asn Leu Ala Thr Leu Lys Ala Glu
85 90 95

Trp Glu Thr His Lys Arg Asn Val Asp Thr Leu Phe Ala Ser Gly Asn
100 105 110

Ala Gly Leu Gly Phe Leu Asp Pro Thr Ala Ala Ile Val Ser Ser Asp
115 120 125

Thr Thr Ala
130

<210> 33
<211> 3607
<212> DNA
<213> Artificial Sequence

<220>
<223> plasmid pAP281-32

<400> 33
cgagctcgcc cctggcttat cgaaattaat acgactcact atagggagac cggaattcga 60
gctcgcccg ggatcctcta gattaacca acgcgtagga gtcaggccat ggcaaataag 120
acaatgcaac cgatcacatc tacagcaaat aaaattgtgt ggtcggatcc aactcgttta 180
tcaactacat ttccagcaag tctgttacgc caacgtgtta aagttggtat agccgaactg 240
aataatgttt caggtcaata tgtatctggt tataagcgtc ctgcacctaa accgaaggtc 300
agatgcctgt gtcattatgc cgaatgaaaa ccaatccatt cgcacagtga ttccagggtc 360
agccgaaaac ttggctacct taaaagcaga atgggaaact cacaacgta acgttgacac 420
actcttcgcg agcggcaacg ccggtttggg ttcccttgac cctactgcgg ctatcgatatc 480
gtctgatact actgcttaag cttgtattct atagtgtcac ctaaatcgta tgtgtatgat 540
acataagggt atgtattaat ggtagccgcg ttctaacgac aatatgtaca agcctaattg 600
tgtagcatct ggcttactga agcagaccct atcatctctc tcgtaaaactg ccgtcagagt 660
cgggttgggt ggacagacct ctgagtttct ggtaacgccc ttccgcaccc cggaaatggg 720
caccgaacca ttccagcagg tcatcgctag ccagatcctc tacgccggac gcatcggtggc 780
ccgcatcacc ggccgacag gtgcggtgct ggccgctata tcgccgacat caccgatggg 840
gaagatcggg ctccgcaact cgggctcatg atcgctgggt tccgctggg tatgggtggca 900

ggccccgtgg	cccgggggac	tgttggggcg	catctccttg	catgcaccat	tccttgcggc	960
ggcggtgctc	aacggcctca	acctactact	gggctgcttc	ctaatagcagg	agtcgcataa	1020
gggagagcgt	cgatatgggtg	cactctcagt	acaatctgct	ctgatgccgc	atagttaagc	1080
caactccgct	atcgctacgt	gactgggtca	tggctgcgcc	ccgacacccg	ccaacacccg	1140
ctgacgcgcc	ctgacgggct	tgtctgcttc	cggcacccgc	ttacagacaa	gctgtgaccg	1200
tctccgggag	ctgcatgtgt	cagaggtttt	caccgtcatc	accgaaacgc	gcgaggcagc	1260
ttgaagacga	aagggcctcg	tgatacgcct	atTTTTtatag	gttaatgtca	tgataataat	1320
ggtttcttag	acgtcaggtg	gcacttttctg	gggaaatgtg	cgcggaaccc	ctattggttt	1380
atTTTTtctaa	atacattcaa	atatgtatcc	gctcatgaga	caataaccct	gataaatgct	1440
tcaataatat	tgaaaaagga	agagtatgag	tattcaacat	ttccgtgtcg	cccttattcc	1500
ctTTTTtgcg	gcattttgcc	ttcctgtttt	tgctcaccca	gaaacgctgg	tgaaagtaaa	1560
agatgctgaa	gatcagttgg	gtgcacgagt	gggttacatc	gaactggatc	tcaacagcgg	1620
taagatcctt	gagagttttc	gccccgaaga	acgtttttca	atgatgagca	cttttaaagt	1680
tctgctatgt	gtcgcggtat	tatcccgtat	tgacgccggg	caagagcaac	tcggtcgccg	1740
catacactat	tctcagaatg	acttggtggt	acctaccagt	cacagaaaag	catcttacgg	1800
atggcatgac	agtaagagaa	ttatgcagtg	ctgccataac	catgagtgat	aacactgcgg	1860
ccaacttact	tctgacaacg	atcggaggac	cgaaggagct	aaccgctttt	ttgcacaaca	1920
tgggggatca	tgtaactcgc	cttgatcggt	gggaaccgga	gctgaatgaa	gccataccaa	1980
acgacgagcg	tgacaccacg	atgcctgtac	gaacggcaac	aacgttgcg	aaactattaa	2040
ctggcgaact	acttactcta	gcttcccggc	aacaattaat	agactggatg	gaggcggata	2100
aagttgcagg	accacttctg	cgctcggccc	ttccggctgg	ctggtttatt	gctgataaat	2160
ctggagccgg	tgagcgtggg	tctcgcggta	tcattgcagc	actggggcca	gatggtaagc	2220
cctcccgtat	cgtagttatc	tacacgacgg	ggagtcaggc	aactatggat	gaacgaaata	2280
gacagatcgc	tgagataggt	gcctcaactga	ttaagcattg	gtaactgtca	gaccaagttt	2340
actcatatat	actttagatt	gatttaaaac	ttcattttta	atttaaaagg	atctaggtga	2400
agatcctttt	tgataatctc	atgacacaaa	tcctttaacg	tgagttttctg	ttccactgag	2460
cggtcagacc	ccgtagaaaag	atcaaaggat	cttcttgaga	tccttttttt	ctgcgcgtaa	2520
tctgctgctt	gcaaacaaaa	aaaccaccgc	taccagcggg	ggtttggttg	ccggatcaag	2580
agctaccaac	tctttttccg	aaggtaactg	gcttcagcag	agcgagata	ccaaatactg	2640
tccttctagt	gtagccgtag	ttaggccacc	acttcaagaa	ctctgtagca	ccgcctacat	2700
acctcgctct	gctaactcctg	ttaccagtgg	ctgctgccag	tggcgataag	tcgtgtctta	2760


```

ccgggttggg ctcaagacga taggtaccgg ataaggcgca gcggtcgggc tgaacggggg 2820
gttcgtgcac acagcccagc ttggagcgaa cgacctacac cgaactgaga tacctacagc 2880
gcgagcattg agaaagcgcc acgcttcccc aaggagagaaa ggcggacagg tatccggtaa 2940
gcggcagggt cggaacaaga gagcgcacga gggagcttcc agggggaaac gcctggtatc 3000
tttatagtcc tgtcggggtt cgccacctct gacttgagcg tcgatttttg tgatgctcgt 3060
cagggggggc gagcctatgg aaaaacgcca gcaacgcggc ctttttacgg ttcctggcct 3120
ttggctggcc ttttgctcac atgttctttc ctgcgttata ccctgattct gtggataacc 3180
gtattaccgc ctttgagtga gctgataccg ctgcgcgcag ccgaacgacc gacggcgagc 3240
cgagtcagtg agcgaggaag cggaagagcg cccaatacgc aaaccgcctc tccccgcgcg 3300
ttggccgatt cattaatgca gctgtggtgt catggtcggt gatcgccagg gtgccgacgc 3360
gcatctcgac tgcattggtc accaatgctt ctggcgtcag gcagccatcg gaagctgtgg 3420
tatggccgtg caggctgtaa atcactgcat aattcgtgtc gctcaaggcg cactcccgtt 3480
ctggataatg ttttttgcgg cgacatcata acggttctgg caaatattct gaaatgagct 3540
ggtgacaatt aatcatcgaa ctagttaact agtacgcaag ttcacgtaaa aagggtatcg 3600
cggaatt 3607

```

```

<210> 34
<211> 21
<212> DNA
<213> Artificial sequence

```

```

<220>
<223> CyCpG

```

```

<400> 34
tccatgacgt tcctgaataa t 21

```

```

<210> 35
<211> 10
<212> PRT
<213> Artificial sequence

```

```

<220>
<223> Melan A 26-35 A/L

```

```

<400> 35

```

```

Glu Leu Ala Gly Ile Gly Ile Leu Thr Val
1           5           10

```

```

<210> 36
<211> 20
<212> PRT

```

<213> Artificial sequence

<220>

<223> Melan A 16-35 A/L

<400> 36

Gly His Gly His Ser Tyr Thr Thr Ala Glu Glu Leu Ala Gly Ile Gly
1 5 10 15

Ile Leu Thr Val
20

<210> 37

<211> 21

<212> PRT

<213> Artificial sequence

<220>

<223> MelanA 20-40 A/L

<400> 37

Ser Tyr Thr Thr Ala Glu Glu Leu Ala Gly Ile Gly Ile Leu Thr Val
1 5 10 15

Ile Leu Gly Val Leu
20

<210> 38

<211> 14

<212> PRT

<213> Artificial Sequence

<220>

<223> MelanA 26-40 A/L

<400> 38

Glu Leu Ala Gly Ile Gly Ile Leu Thr Val Ile Leu Gly Val
1 5 10

<210> 39

<211> 21

<212> PRT

<213> Artificial Sequence

<220>

<223> MelanA 16-35

<400> 39

Cys Gly His Gly His Ser Tyr Thr Thr Ala Glu Glu Ala Ala Gly Ile
1 5 10 15

Gly Ile Leu Thr Val
20

<210> 40
<211> 21
<212> PRT
<213> Artificial sequence

<220>
<223> MelanA 16-35 A/L

<400> 40

Cys Gly His Gly His Ser Tyr Thr Thr Ala Glu Glu Leu Ala Gly Ile
1 5 10 15

Gly Ile Leu Thr Val
20

<210> 41
<211> 13
<212> PRT
<213> Artificial Sequence

<220>
<223> MelanA 26-35

<400> 41

Cys Gly Gly Glu Ala Ala Gly Ile Gly Ile Leu Thr Val
1 5 10

<210> 42
<211> 13
<212> PRT
<213> Artificial Sequence

<220>
<223> MelanA 26-35 A/L

<400> 42

Cys Gly Gly Glu Leu Ala Gly Ile Gly Ile Leu Thr Val
1 5 10

<210> 43
<211> 22
<212> PRT
<213> Artificial sequence

<220>
<223> MelanA 20-40 A/L

<400> 43

Cys Ser Tyr Thr Thr Ala Glu Glu Leu Ala Gly Ile Gly Ile Leu Thr

<220>

<221> REPEAT
 <222> (1)..(1)
 <223> Glycine can be repeated from zero to five times

<220>
 <221> REPEAT
 <222> (3)..(3)
 <223> Glycine can be repeated from zero to ten times

<220>
 <221> REPEAT
 <222> (4)..(4)
 <223> Serine can be repeated from zero to two times

<220>
 <221> REPEAT
 <222> (5)..(9)
 <223> These residues can be repeated from zero to three times as a group

<400> 47

Gly Cys Gly Ser Gly Gly Gly Gly Ser
 1 5

<210> 48
 <211> 10
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> C terminal glycine serine linkers

<220>
 <221> REPEAT
 <222> (1)..(1)
 <223> Glycine can be repeated from zero to ten times

<220>
 <221> REPEAT
 <222> (2)..(2)
 <223> Serine can be repeated from zero to two times

<220>
 <221> REPEAT
 <222> (3)..(7)
 <223> These residues can be repeated from zero to three times as a group

<220>
 <221> REPEAT
 <222> (8)..(8)
 <223> Glycine can be repeated from zero to eight times

<220>
 <221> REPEAT
 <222> (10)..(10)
 <223> Glycine can be repeated from zero to five times

<400> 48

Gly Ser Gly Gly Gly Gly Ser Gly Cys Gly
1 5 10

<210> 49

<211> 5

<212> PRT

<213> Artificial Sequence

<220>

<223> Glycine serine linker

<400> 49

Gly Gly Gly Gly Ser
1 5

<210> 50

<211> 10

<212> PRT

<213> Artificial Sequence

<220>

<223> N-terminal gamma1

<400> 50

Cys Gly Asp Lys Thr His Thr Ser Pro Pro
1 5 10

<210> 51

<211> 10

<212> PRT

<213> Artificial Sequence

<220>

<223> C-terminal gamma 1

<400> 51

Asp Lys Thr His Thr Ser Pro Pro Cys Gly
1 5 10

<210> 52

<211> 17

<212> PRT

<213> Artificial Sequence

<220>

<223> N-terminal gamma 3

<400> 52

Cys Gly Gly Pro Lys Pro Ser Thr Pro Pro Gly Ser Ser Gly Gly Ala
1 5 10 15

Pro

<210> 53
 <211> 18
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> C-terminal gamma 3

<400> 53

Pro Lys Pro Ser Thr Pro Pro Gly Ser Ser Gly Gly Ala Pro Gly Gly
 1 5 10 15

Cys Gly

<210> 54
 <211> 6
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> N-terminal glycine linker

<400> 54

Gly Cys Gly Gly Gly Gly
 1 5

<210> 55
 <211> 6
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> C-terminal glycine linker

<400> 55

Gly Gly Gly Gly Cys Gly
 1 5

<210> 56
 <211> 6
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> C-terminal glycine-lysine linker

<400> 56

Gly Gly Lys Lys Gly Cys
1 5

<210> 57
<211> 6
<212> PRT
<213> Artificial Sequence

<220>
<223> N-terminal glycine-lysine linker

<400> 57

Cys Gly Lys Lys Gly Gly
1 5

<210> 58
<211> 6
<212> PRT
<213> Artificial Sequence

<220>
<223> N-terminal linker 1

<400> 58

Cys Gly Lys Lys Gly Gly
1 5

<210> 59
<211> 6
<212> PRT
<213> Artificial Sequence

<220>
<223> N-terminal linker 2

<400> 59

Cys Gly Asp Glu Gly Gly
1 5

<210> 60
<211> 6
<212> PRT
<213> Artificial Sequence

<220>
<223> C-terminal liker

<400> 60

Gly Gly Lys Lys Gly Cys
1 5

<210> 61

<211> 6
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> C-terminal linker 2

<400> 61

Gly Gly Glu Asp Gly Cys
 1 5

<210> 62
 <211> 4
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> C-terminal linker 3

<400> 62

Gly Gly Cys Gly
 1

<210> 63
 <211> 9
 <212> PRT
 <213> Homo sapiens

<400> 63

Lys Thr Trp Gly Gln Tyr Trp Gln Val
 1 5

<210> 64
 <211> 9
 <212> PRT
 <213> Homo sapiens

<400> 64

Ile Thr Asp Gln Val Pro Phe Ser Val
 1 5

<210> 65
 <211> 9
 <212> PRT
 <213> Homo Sapiens

<400> 65

Tyr Leu Glu Pro Gly Pro Val Thr Ala
 1 5

<210> 66

<211> 10
 <212> PRT
 <213> Homo sapiens

<400> 66

Leu Leu Asp Gly Thr Ala Thr Leu Arg Leu
 1 5 10

<210> 67
 <211> 10
 <212> PRT
 <213> Homo sapiens

<400> 67

Val Leu Tyr Arg Tyr Gly Ser Phe Ser Val
 1 5 10

<210> 68
 <211> 10
 <212> PRT
 <213> Homo sapiens

<400> 68

Glu Ala Ala Gly Ile Gly Ile Leu Thr Val
 1 5 10

<210> 69
 <211> 9
 <212> PRT
 <213> Homo sapiens

<400> 69

Ala Ala Gly Ile Gly Ile Leu Thr Val
 1 5

<210> 70
 <211> 9
 <212> PRT
 <213> Homo sapiens

<400> 70

Ile Leu Thr Val Ile Leu Gly Val Leu
 1 5

<210> 71
 <211> 9
 <212> PRT
 <213> Homo sapiens

<400> 71

Met Leu Leu Ala Val Leu Tyr Cys Leu
1 5

<210> 72
<211> 9
<212> PRT
<213> Homo sapiens

<400> 72

Tyr Met Asp Gly Thr Met Ser Gln Val
1 5

<210> 73
<211> 9
<212> PRT
<213> Homo sapiens

<400> 73

Val Leu Pro Asp Val Phe Ile Arg Cys
1 5

<210> 74
<211> 9
<212> PRT
<213> Homo sapiens

<400> 74

Phe Leu Trp Gly Pro Arg Ala Leu Val
1 5

<210> 75
<211> 9
<212> PRT
<213> Homo sapiens

<400> 75

Tyr Leu Ser Gly Ala Asn Leu Asn Leu
1 5

<210> 76
<211> 8
<212> PRT
<213> Homo sapiens

<400> 76

Arg Met Pro Glu Ala Ala Pro Pro
1 5

<210> 77
<211> 9

<212> PRT
 <213> Homo sapiens

<400> 77

Ser Thr Pro Pro Pro Gly Thr Arg Val
 1 5

<210> 78
 <211> 9
 <212> PRT
 <213> Homo sapiens

<400> 78

Leu Leu Gly Arg Asn Ser Phe Glu Val
 1 5

<210> 79
 <211> 9
 <212> PRT
 <213> Homo sapiens

<400> 79

Lys Ile Phe Gly Ser Leu Ala Phe Leu
 1 5

<210> 80
 <211> 9
 <212> PRT
 <213> Homo sapiens

<400> 80

Ile Ile Ser Ala Val Val Gly Ile Leu
 1 5

<210> 81
 <211> 8
 <212> PRT
 <213> Homo sapiens

<400> 81

Thr Leu Gly Ile Val Cys Pro Ile
 1 5

<210> 82
 <211> 9
 <212> PRT
 <213> Homo sapiens

<400> 82

Lys Ala Val Tyr Asn Phe Ala Thr Met

1

5

<210> 83
 <211> 12
 <212> PRT
 <213> Homo sapiens

<400> 83

Cys Gly Gly Lys Ala Val Tyr Asn Phe Ala Thr Met
 1 5 10

<210> 84
 <211> 12
 <212> PRT
 <213> Homo sapiens

<400> 84

Lys Ala Val Tyr Asn Phe Ala Thr Met Gly Gly Cys
 1 5 10

<210> 85
 <211> 18
 <212> PRT
 <213> Homo sapiens

<400> 85

Cys Gly Gly Gly Ser Glu Glu Ile Arg Ser Leu Tyr Asn Thr Val Ala
 1 5 10 15

Thr Leu

<210> 86
 <211> 50
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> HIV Gag-G50

<400> 86

Cys Gln Gly Gln Met Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn
 1 5 10 15

Ala Trp Val Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala
 20 25 30

Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr
 35 40 45

Val Lys
50

<210> 87
<211> 56
<212> PRT
<213> Artificial Sequence

<220>
<223> HIV Nef-N56

<400> 87

Cys Gly Val Gly Phe Pro Val Arg Pro Gln Val Pro Leu Arg Pro Met
1 5 10 15

Thr Tyr Lys Ala Ala Val Asp Leu Ser His Phe Leu Lys Glu Lys Gly
20 25 30

Gly Leu Glu Gly Pro Gly Ile Arg Tyr Pro Leu Thr Phe Gly Trp Cys
35 40 45

Phe Lys Leu Val Pro Val Glu Pro
50 55

<210> 88
<211> 69
<212> PRT
<213> Artificial Sequence

<220>
<223> Gag-G68n

<400> 88

Cys Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys Ile
1 5 10 15

Val Arg Met Tyr Gln Gly Gln Met Val His Gln Ala Ile Ser Pro Arg
20 25 30

Thr Leu Asn Ala Trp Val Lys Ala Phe Ser Pro Glu Val Ile Pro Met
35 40 45

Phe Ser Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met
50 55 60

Leu Asn Thr Val Lys
65

<210> 89
 <211> 9
 <212> PRT
 <213> Homo sapiens

<400> 89

Leu Ala Gly Ile Gly Ile Leu Thr Val
 1 5

<210> 90
 <211> 9
 <212> PRT
 <213> Homo sapiens

<400> 90

Met Ala Gly Ile Gly Ile Leu Thr Val
 1 5

<210> 91
 <211> 10
 <212> PRT
 <213> Homo sapiens

<400> 91

Glu Ala Met Gly Ile Gly Ile Leu Thr Val
 1 5 10

<210> 92
 <211> 10
 <212> PRT
 <213> Homo sapiens

<400> 92

Glu Met Ala Gly Ile Gly Ile Leu Thr Val
 1 5 10

<210> 93
 <211> 10
 <212> PRT
 <213> Homo sapiens

<400> 93

Tyr Ala Ala Gly Ile Gly Ile Leu Thr Val
 1 5 10

<210> 94
 <211> 10
 <212> PRT
 <213> Homo sapiens

<400> 94

Phe Ala Ala Gly Ile Gly Ile Leu Thr Val
 1 5 10

<210> 95
 <211> 9
 <212> PRT
 <213> Homo sapiens

<400> 95

Leu Pro Tyr Leu Gly Trp Leu Val Phe
 1 5

<210> 96
 <211> 206
 <212> PRT
 <213> Human immunodeficiency virus

<400> 96

Met Gly Gly Lys Trp Ser Lys Arg Ser Val Val Gly Trp Pro Thr Val
 1 5 10 15

Arg Glu Arg Met Arg Arg Ala Glu Pro Ala Ala Asp Gly Val Gly Ala
 20 25 30

Val Ser Arg Asp Leu Glu Lys His Gly Ala Ile Thr Ser Ser Asn Thr
 35 40 45

Ala Ala Asn Asn Ala Asp Cys Ala Trp Leu Glu Ala Gln Glu Glu Glu
 50 55 60

Glu Val Gly Phe Pro Val Arg Pro Gln Val Pro Leu Arg Pro Met Thr
 65 70 75 80

Tyr Lys Ala Ala Val Asp Leu Ser His Phe Leu Lys Glu Lys Gly Gly
 85 90 95

Leu Glu Gly Leu Ile Tyr Ser Gln Lys Arg Gln Asp Ile Leu Asp Leu
 100 105 110

Trp Val Tyr His Thr Gln Gly Tyr Phe Pro Asp Trp Gln Asn Tyr Thr
 115 120 125

Pro Gly Pro Gly Ile Arg Tyr Pro Leu Thr Phe Gly Trp Cys Phe Lys
 130 135 140

Leu Val Pro Val Glu Pro Glu Lys Val Glu Glu Ala Asn Glu Gly Glu
 145 150 155 160

Asn Asn Ser Leu Leu His Pro Met Ser Leu His Gly Met Asp Asp Pro
 165 170 175

Glu Arg Glu Val Leu Val Trp Lys Phe Asp Ser Arg Leu Ala Phe His
 180 185 190

His Met Ala Arg Glu Leu His Pro Glu Tyr Tyr Lys Asp Cys
 195 200 205

<210> 97

<211> 500

<212> PRT

<213> Human immunodeficiency virus

<400> 97

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
 1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
 20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
 35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
 50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
 65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Glu Val Lys Asp
 85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
 100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
 115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
 130 135 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
 145 150 155 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
 165 170 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
 180 185 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
 195 200 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
 210 215 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
 225 230 235 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
 245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
 260 265 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
 275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
 290 295 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
 305 310 315 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
 325 330 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
 340 345 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
 355 360 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Arg Gly Asn Phe Arg
 370 375 380

Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
 385 390 395 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys

405

410

415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
 420 425 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
 435 440 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
 450 455 460

Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp
 465 470 475 480

Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
 485 490 495

Pro Ser Ser Gln
 500

<210> 98
 <211> 34
 <212> PRT
 <213> Human immunodeficiency virus

<400> 98

Val Gly Phe Pro Val Arg Pro Gln Val Pro Leu Arg Pro Met Thr Tyr
 1 5 10 15

Lys Ala Ala Val Asp Leu Ser His Phe Leu Lys Glu Lys Gly Gly Leu
 20 25 30

Glu Gly

<210> 99
 <211> 20
 <212> PRT
 <213> Human immunodeficiency virus

<400> 99

Pro Gly Ile Arg Tyr Pro Leu Thr Phe Gly Trp Cys Phe Lys Leu Val
 1 5 10 15

Pro Val Glu Pro
 20

<210> 100
 <211> 5
 <212> PRT
 <213> Human immunodeficiency virus

<400> 100

Lys Val Val Glu Glu
 1 5

<210> 101
 <211> 18
 <212> PRT
 <213> Human immunodeficiency virus

<400> 101

Gln Gly Gln Met Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala
 1 5 10 15

Trp Val

<210> 102
 <211> 30
 <212> PRT
 <213> Human immunodeficiency virus

<400> 102

Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser Glu
 1 5 10 15

Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val
 20 25 30

<210> 103
 <211> 19
 <212> PRT
 <213> Human immunodeficiency virus

<400> 103

Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys Ile Val
 1 5 10 15

Arg Met Tyr

<210> 104
 <211> 54
 <212> PRT
 <213> Human immunodeficiency virus

<400> 104

Val Gly Phe Pro Val Arg Pro Gln Val Pro Leu Arg Pro Met Thr Tyr
 1 5 10 15

Lys Ala Ala Val Asp Leu Ser His Phe Leu Lys Glu Lys Gly Gly Leu
 20 25 30

Glu Gly Pro Gly Ile Arg Tyr Pro Leu Thr Phe Gly Trp Cys Phe Lys
 35 40 45

Leu Val Pro Val Glu Pro
 50

<210> 105

<211> 48

<212> PRT

<213> Human immunodeficiency virus

<400> 105

Gln Gly Gln Met Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala
 1 5 10 15

Trp Val Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu
 20 25 30

Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val
 35 40 45

<210> 106

<211> 49

<212> PRT

<213> Artificial Sequence

<220>

<223> HIV C_Gag-G50

<400> 106

Cys Gln Gly Gln Met Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn
 1 5 10 15

Ala Trp Val Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala
 20 25 30

Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr
 35 40 45

Val

<210> 107
 <211> 67
 <212> PRT
 <213> Human immunodeficiency virus

<400> 107

Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys Ile Val
 1 5 10 15

Arg Met Tyr Gln Gly Gln Met Val His Gln Ala Ile Ser Pro Arg Thr
 20 25 30

Leu Asn Ala Trp Val Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe
 35 40 45

Ser Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu
 50 55 60

Asn Thr Val
 65

<210> 108
 <211> 68
 <212> PRT
 <213> Artificial Sequence

<220>

<223> HIV C_Gag-G68n

<400> 108

Cys Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys Ile
 1 5 10 15

Val Arg Met Tyr Gln Gly Gln Met Val His Gln Ala Ile Ser Pro Arg
 20 25 30

Thr Leu Asn Ala Trp Val Lys Ala Phe Ser Pro Glu Val Ile Pro Met
 35 40 45

Phe Ser Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met
 50 55 60

Leu Asn Thr Val
 65

<210> 109
 <211> 118

<212> PRT
 <213> homo sapiens

<400> 109

Met Pro Arg Glu Asp Ala His Phe Ile Tyr Gly Tyr Pro Lys Lys Gly
 1 5 10 15

His Gly His Ser Tyr Thr Thr Ala Glu Ala Ala Gly Ile Gly Ile
 20 25 30

Leu Thr Val Ile Leu Gly Val Leu Leu Leu Ile Gly Cys Trp Tyr Cys
 35 40 45

Arg Arg Arg Asn Gly Tyr Arg Ala Leu Met Asp Lys Ser Leu His Val
 50 55 60

Gly Thr Gln Cys Ala Leu Thr Arg Arg Cys Pro Gln Glu Gly Phe Asp
 65 70 75 80

His Arg Asp Ser Lys Val Ser Leu Gln Glu Lys Asn Cys Glu Pro Val
 85 90 95

Val Pro Asn Ala Pro Pro Ala Tyr Glu Lys Leu Ser Ala Glu Gln Ser
 100 105 110

Pro Pro Pro Tyr Ser Pro
 115

<210> 110
 <211> 16
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> CSPKSL-Melana 26-35 A/L

<400> 110

Cys Ser Pro Lys Ser Leu Glu Leu Ala Gly Ile Gly Ile Leu Thr Val
 1 5 10 15

<210> 111
 <211> 18
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Melana 26-40-C A/L

<400> 111

Glu Leu Ala Gly Ile Gly Ile Leu Thr Val Ile Leu Gly Val Leu Gly
1 5 10 15

Gly Cys